Selected Abstracts from the March Issue of the European Journal of Vascular and Endovascular Surgery

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Predictors of Stroke and Paraplegia in Thoracic Aortic Endovascular Intervention

Clough R.E., Modarai B., Topple J.A., Bell R.E., Carrell T.W.G., Zayed H.A., Waltham M., Taylor P.R. Eur J Vasc Endovasc Surg 2011;41:303-10.

Background: Endoluminal repair of thoracic aortic pathology has become established in clinical practice, but is associated with significant neurological complications. The aim of this study was to identify factors that were predictive of stroke and paraplegia.

Methods: Prospective data was collected for a cohort of 293 consecutive patients having thoracic aortic endovascular repair between August 1997 and September 2009. Patient and procedural characteristics were related to the incidence of stroke and paraplegia using multivariate logistic regression analysis.

Results: The median age was 68 years (18–87), there were 191 men and 102 women. Mortality was 5.1% for 195 elective and 13.4% for 98 urgent patients. Stroke affected 16 (5.5%) patients: 11 affected the anterior and 5 the posterior circulation. Coverage of the left subclavian artery with no revascularisation was the only significant factor predictive of stroke (OR 5.34 (1.42–20.40) $P = 0.01$). Paraplegia affected 16 patients (5.5%) but no independent risk factor was identified: 12 were identified perioperatively and 4 were delayed by up to 6 months.

Conclusion: Covering the left subclavian artery without revascularisation increases the risk of stroke following endoluminal repair of thoracic pathology. Paraplegia appears to be more complex and no independent precipitating factor was identified.

Sizing Fenestrated Aortic Stent-grafts

Malkawi A.H., Resch T.A., Bown M.J., Manning B.J., Poloniecki J.D., Nordon I.M., Loftus I.M., Thompson M.M., Hinchliffe R.J. Eur J Vasc Endovasc Surg 2011;41:311-6.

Introduction: Fenestrated aortic stent-grafts are increasingly being used to treat patients with juxtarenal abdominal aortic aneurysms (AAA). Sizing of these stent-grafts is critical to ensure success and requires detailed expert assessment of aortic morphology. At present little is known about how sizing of these stent-grafts varies between observers and the necessary tolerances involved to ensure a successful procedure.

Methods: CT scans of 19 consecutive patients with juxtarenal aortic aneurysms that underwent successful endovascular repair with fenestrated stent-grafts were selected. Sizing of fenestrated aortic stent-grafts was performed independently by four experienced endovascular surgeons and results were compared. Data from the stent-graft manufacturer was available for comparison in 12 cases.

Results: All observers agreed on the number of fenestrations; 16 devices had 3 fenestrations and 3 had 4. The overall inter-observer measurement error for all target vessel orientation was ±12.6° (10.8–14.4 95% CI), and for distance between target vessels ±5.3 mm (4.4–6.2 95% CI). The median difference in internal stent-graft diameter was 1 stent size. Agreement on fenestration type ranged from (84–95%). Comparison was performed with the manufactured stent-graft in 12 cases. The overall mean difference of target vessel orientation between the manufactured devices and the four observers was −1.3° (SD ± 6.9,−3.8–1.2 95% CI). There was less agreement between observers and device manufacturers on body and limb lengths and distal limb diameters.

Conclusions: There was generally a high level of agreement between experienced endovascular surgeons in sizing the fenestrated stent component. There were differences in component lengths but these could have been accommodated by varying the degree of overlap between components.

Early and Long-term Outcome after Thoracic Endovascular Aortic Repair (TEVAR) for Acute Complicated Type B Aortic Dissection

Steuer J., Eriksson M.-O., Nyman R., Björck M., Wanhainen A. Eur J Vasc Endovasc Surg 2011;41:318-23.

Objectives: The study aimed to investigate early and long-term outcome of thoracic endovascular aortic repair (TEVAR) for acute complicated type B dissection.

Design: This was a retrospective, single-centre, consecutive case series.

Materials and Methods: During the period 1999–2009, TEVAR was carried out in 50 patients with non-traumatic acute complicated type B dissection, and in another 10 patients with acute complications, including rupture, end-organ ischaemia and acute dilatation during the primary hospitalisation, but >14 days after onset of symptoms. Thus, in total, 60 patients were included; 22 with a DeBakey type IIIa dissection and 38 with a type IIIb; median age was 67 years. Early (30-day) and long-term (5-year) survival, re-intervention rate and complications were recorded until 1 July 2010.

Results: Within 30 days, two (3%) deaths, one (2%) paraplegia and three (5%) strokes were observed. Five-year survival was 87% and freedom from re-intervention at 5 years was 65%.

Conclusions: In patients with acute complicated type B aortic dissection, TEVAR can be performed with excellent early and long-term survival, whereas morbidity and long-term durability must be further elucidated.

Quality of Life in Patients with Small Abdominal Aortic Aneurysm: The Effect of Early Endovascular Repair Versus Surveillance in the CAESAR Trial

De Rango P., Verzini F., Parlani G., Cieri E., Romano L., Loschi D., Cao P., for the Comparison of surveillance vs. Aortic Endografting for Small Aneurysm Repair (CAESAR) Investigators. Eur J Vasc Endovasc Surg 2011;41:324-31.

Objective: To evaluate and compare changes over time in health-related quality of life reported by patients with small (4.1–5.4 cm) abdominal aortic aneurysms (AAAs) undergoing endovascular aortic aneurysm repair (EVAR) or surveillance.

Methods: Participants were randomly assigned to receive either early EVAR or surveillance within a multicentre, randomised clinical trial on small AAA (Comparison of surveillance vs. Aortic Endografting for Small Aneurysm Repair, CAESAR). Patient-reported health-related quality of life was assessed before randomisation, at 6 months and yearly thereafter using the Short Form 36 (SF-36) Health Survey.

Results: Between 2004 and 2008, 360 patients (345 males, mean age 68.9 years) were randomised, 182 to early EVAR and 178 to surveillance. There was one perioperative death. Mean follow-up was 31.8 months. No significant difference in survival was found. At baseline, comparable quality of life scores were recorded in both treatment groups: Total SF-36: 73.0 versus 75.5 ($p = 0.18$), Physical domain: 71.4 versus 73.3 ($p = 0.33$); Mental health domain: 70.9 versus 72.7 ($p = 0.33$), in the EVAR arm versus the surveillance arm, respectively. Six months after randomisation, Total SF-36 and Physical and Mental domain scores were all significantly higher with respect to baseline in the EVAR group, while patients of the surveillance group scored lower. The differences between EVAR and surveillance arms in score changes at 6 months were significant and in favour of EVAR: Total score: difference 5.4; $p = 0.0017$; Physical: difference 3.8; $p = 0.02$; and Mental: difference 6.0; $p = 0.0005$. Differences between EVAR and surveillance diminished over time. At the last assessment, patients in both groups had decreased scores with a significant drop with respect to the baseline (−3.9 in EVAR, −6.3 in surveillance). There were no significant differences between the EVAR and surveillance arms: Total score: $p = 0.25$; Physical: $p = 0.47$; and Mental: $p = 0.38$.

Conclusions: Patients with small AAA under surveillance compared with early EVAR had significant impaired functional health at 6 months after assignment. After a mean of 31.8 months, SF-36 health-related quality of life in patients allocated to early EVAR and surveillance was similar.

Urgent Carotid Endarterectomy in Patients with Recent/Crescendo Transient Ischaemic Attacks or Acute Stroke

Dorigo W., Pulli R., Nesi M., Alessi Innocenti A., Pratesi G., Inzitari D., Pratesi C. Eur J Vasc Endovasc Surg 2011;41:351-7.

Objectives: Objective of this study was to review the results of urgent carotid endarterectomy (CEA) performed in patients with recent (<24 h) or crescendo (at least 2 episodes in 24 h) transient ischaemic attack (TIA) or with acute stroke in a single centre experience.

Materials and Methods: From January 2000 to December 2008, 75 patients underwent urgent CEA for severe internal carotid artery stenosis and recent/crescendo TIA (51 patients, TIA group) or acute stroke (24 patients, stroke group). In patients with acute stroke the intervention was proposed on the basis of clinical and instrumental features (patient conscious, patency of middle cerebral artery, no lesions or limited brain infarction at CT scan) according to neurologists' suggestion. Data from all the interventions were prospectively collected in a dedicated database, which

included main pre-, intra- and postoperative parameters. Independent neurological assessment with National Institute of Health Stroke Scale (NIHSS) score calculation was performed before the operation and within the 30th postoperative day.

Early (<30 days) results were evaluated in terms of mortality, modifications in NIHSS values and stroke and death rates. The surveillance program consisted of clinical and ultrasonographic examinations at 1, 6 and 12 months and yearly thereafter. Follow-up results (survival, occurrence of ipsilateral stroke in TIA group, recurrence of stroke in stroke group) were analysed by Kaplan–Meier curves.

Results: Among patients presenting with TIA, 28 had crescendo TIAs and 23 had a recent TIA; In stroke group, two patients had a stroke in evolution, eight patients had a recent major non-disabling stroke and 14 patients had a recent minor stroke.

Preoperative mean value of NIHSS score in stroke group was 4.7 (SD 3.2).

There were 2 perioperative (<30 days) deaths, both in stroke group, in one case due to acute respiratory failure and to fatal stroke in the other one (preoperative NIHSS value 9, postoperative 17), with a cumulative 30-day mortality rate of 2.7%, significantly higher in stroke group (8.3%) than in TIA group (no death, $p = 0.03$). No postoperative cerebral haemorrhage occurred.

In TIA group one postoperative major stroke occurred, with a 30-day stroke and death rate of 1.9%.

In surviving patients of stroke group NIHSS value improved in 13 cases, with a mean improvement of 2 points (SD 0.9); in 8 cases the value remained unchanged, while in the remaining case it increased from 2 to 4. Mean postoperative NIHSS score in stroke group was 3.9 (SD 3.7), significantly reduced in comparison with preoperative value ($p < 0.001$).

Mean duration of follow-up was 34 months (SD 28.1). No ipsilateral stroke in patients of TIA group occurred; in stroke group a recurrent fatal stroke at 1 postoperative month was recorded. Estimated 48-month stroke-free survival rate TIA group was 95% and 79% in stroke group ($p = 0.02$).

Conclusions: Urgent CEA in patients with recent/crescendo TIA provided in our experience excellent results, with low rates of perioperative and late stroke. In selected patients with acute stroke early surgery seems to provide acceptable results.

Patients' Radiation Doses During the Implantation of Stents in Carotid, Renal, Iliac, Femoral and Popliteal Arteries

Majewska N., Blaszak M.A., Juszkat R., Frankiewicz M., Makalowski M., Majewski W. Eur J Vasc Endovasc Surg 2011;41:372-7.

Objectives and Design: The aim of the study was to document the radiation doses to patients during the implantation of stents in various arteries and to discuss potential reasons for prolongation of radiological procedures.

Materials and Methods: Measurements of air kerma (Gy) and dose–area product (Gy cm^2) (DAP) were carried out simultaneously on a sample of 345 patients, who underwent different interventional radiological procedures involving angioplasty with stenting of 73 carotid (21.5%), 22 renal (6.5%), 160 iliac (45%), 63 femoral (18.6%) and 27 popliteal (7.9%) arteries.

Results: The highest mean air kerma values for fluoroscopy and exposure were found for renal angioplasty (340 and 420 mGy, respectively). With regard to total DAP values, the highest were obtained for renal (148 Gy cm^2) and iliac/The Inter-Society Consensus for Management of Peripheral Arterial Disease (TASC) II C (199 Gy cm^2) stent implantation. The lowest values were for carotid (53 Gy cm^2), iliac/TASC II A (6.3 Gy cm^2) and femoral/TASC II A (53 Gy cm^2) arteries. For 3.5% of the patients, the air kerma was between 1 and 1.5 Gy and for 1.5%, it was between 1.5 and 2 Gy.

Conclusions: In procedures performed on the arteries of the lower limbs, a significantly higher dose was received by patients with TASC II C lesions. With regard to the number of stents implanted, the total DAP value was 50% higher for simultaneous three-stent implantation than for one or two stents.

A Systematic Review of Free Tissue Transfer in the Management of Non-traumatic Lower Extremity Wounds in Patients with Diabetes

Fitzgerald O'Connor E.J., Vesely M., Holt P.J., Jones K.G., Thompson M.M., Hinchliffe R.J. Eur J Vasc Endovasc Surg 2011;41:391-9.

Objectives: Wounds of the lower limb in patients with diabetes are frequently difficult to heal. Some wounds fail to heal despite optimal medical and surgical care. This review examines the evidence for whether free tissue transfer techniques may reduce the requirement of amputation in these patients.

Design: A systematic review.

Materials & Methods: Pubmed, Embase, AMED, SCOPUS and CINAHL and Cochrane Library were searched for all articles on free tissue transfer in lower limb wounds in patients with diabetes (September 2010). Current experience, indications and outcomes were analysed.

Results: 528 patients from 18 studies were included in the systematic review. 66% of patients had concomitant revascularisation with bypass surgery. 63% of flaps were muscle based, 35% fasciocutaneous and 1.7% omental. Pooled in-hospital mortality rate was 4.4%, flap survival was 92% and limb salvage rate of 83.4% over a 28 months average follow-up time.

Conclusions: In conclusion free tissue transfer achieves successful wound healing in selected patients with diabetes and difficult to heal wounds that would have required amputation. Pre-operative optimisation of vascular supply and eradication of infection is key to success. Objective wound assessment scores and a clear multidisciplinary team (MDT) approach would improve patient care.

Does Puncture Site Affect the Rate of Nerve Injuries Following Endovenous Laser Ablation of the Small Saphenous Veins?

Doganci S., Yildirim V., Demirkilic U. Eur J Vasc Endovasc Surg 2011;41: 400-5.

Objectives: The small saphenous vein (SSV) lies in close relationship with sural nerve and is at risk of damage during surgery or vein ablation procedures on this vein. The aim of this study was to compare the effect of puncture site for SSV endovenous laser ablation (EVLA) on the rate of post-operative sural nerve injury.

Design: Randomised controlled study.

Patients and Methods: Sixty patients with isolated SSV varicose veins (68 limbs) were randomised into two groups. All patients were treated with endovenous laser ablation procedures using radial fibres and a 1470 nm diode laser. In Group 1, SSVs were canulated from lateral malleolar part of the SSV. In Group 2, SSVs were canulated in the mid-calf. EVLA procedures were performed by using 12 W energy and 70 J cm^{-1} LEED (linear endovenous energy density). Local pain, ecchymosis, induration and paraesthesia in treated regions, vein diameter, treated vein length, tumescent anaesthesia volume, delivered energy were recorded. Follow-up visits were arranged on the 2nd post-operative day, 7th day, 1st, 2nd, 3rd and 6th months.

Results: The mean SSV diameters at sapheno-popliteal junction (SPJ) and calf levels were Group 1 SPJ: 6.6 S.D. 1.2 mm, Calf: 5.1 S.D. 1.1 mm, and Group 2 SPJ: 6.8 S.D. 1.6 mm, Calf: 4.9 S.D. 1.3 mm. Adverse events after treatment were 1 patient with induration, 3 with ecchymosis and 6 minimal paraesthesia in Group 1 (malleolar) and 1 local pain, 4 minimal ecchymosis or induration and 1 paraesthesia in Group 2 (mid-calf). In Group 1 in two patients the paraesthesia lasted 2 months and then resolved spontaneously. In the remaining four patients' paraesthesia resolved in less than 1 month without treatment. In Group 2 paraesthesia resolved spontaneously in two weeks. Induration, ecchymosis and local pain also resolved in less than 2 weeks in both groups. There was no recanalisation or reflux in the treated SSV of either group during the follow-up period.

Conclusion: Treatment of the SSV by endovenous laser ablation using a 1470 nm laser and a radial fibre is safe and effective. Puncturing the vein at mid-calf level causes less post-operative nerve injury without affecting the recanalisation rates.

T-cell-pre-stimulated Monocytes Promote Neovascularisation in a Murine Hind Limb Ischaemia Model

Hellingman A.A., Zwaginga J.J., van Beem R.T., TeRM/Smart Mix Consortium, Hamming J.F., Fibbe W.E., Quax P.H.A., Geutskens S.B. Eur J Vasc Endovasc Surg 2011;41:418-28.

Aim: Monocytes play a significant role in neovascularisation. The stimuli that differentiate monocytes along a pro-angio-/arteriogenic-supporting pathway are currently unclear. We investigated whether pre-stimulation of human monocytes with soluble T-cell-derived factors improves revascularisation in murine hind limb ischaemia as a new option for therapeutic angio- and arteriogenesis.

Design: Human monocytes were cultured with or without soluble T-cell-derived factors. Unstimulated and pre-stimulated monocytes were transfused after induction of hind limb ischaemia in nude mice.

Methods: Blood flow was measured with laser Doppler perfusion imaging. Collaterals were visualised by immunohistochemistry and angiography. Monocytes were characterised by flowcytometry and Bio-Plex assays.

Results: Transfusion of T-cell-pre-stimulated monocytes significantly improved blood flow recovery after hind limb ischaemia and increased collateral size and collateral and capillary number in the post-ischaemic paw. Pre-stimulated monocytes produced a wide variety of factors that support neovascularisation such as platelet-derived growth factor-BB, vascular-endothelial growth factor, interleukin-4 and tumour necrosis factor-α. Few transfused human cells were detected in the muscle tissue, suggesting that paracrine rather than direct effects appear responsible for the enhanced recovery of blood flow observed.

Conclusion: These results show a beneficial role for T-cell-pre-stimulated monocytes in neovascularisation, rendering the monocyte a potential candidate for regenerative cell therapy that promotes revascularisation in peripheral arterial disease patients.